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- (57) Claim

1. An object handling apparatus for storing objects, comprising a receptacle having an opening therein for receiving an object into the receptacle, and receiving and delivering means for receiving the object and delivering it to the opening for entry into the receptacle, wherein the apparatus is arranged such that exterior access to the opening is at least substantially prevented by the receiving and delivering means when the receiving and delivering means is in a receiving condition for receiving the object and is prevented by means comprising at least another portion of the apparatus when the receiving and delivering means is in a delivery condition at which the object can pass therefrom to the opening.

13. An object handling apparatus comprising:
a supporting structure, and a drawer movably received by said supporting structure such that the drawer may be moved between an extended position wherein a portion of the drawer extends from the supporting structure, and a closed position wherein the drawer is substantially enclosed by the supporting structure, said drawer including an aperture for receiving an object, and retaining means which, in use, acts to retain an object when received in the aperture when said drawer is in said extended position, and which, when the drawer is moved from the extended position to the closed position, moves to allow the object to pass through said aperture and into the supporting structure.

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COMPLETE SPECIFICATION
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Invention Title: OBJECT HANDLING APPARATUS

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The following statement is a full description of this invention, including the best method of performing it known to me/us:

OBJECT HANDLING APPARATUS

The present invention relates to an object handling apparatus, an object guiding device and manipulating apparatus.

5

In accordance with one aspect of the present invention there is provided an object handling apparatus for storing objects, comprising a receptacle having an opening therein for receiving an object into the receptacle, and receiving and delivering means for receiving the object and delivering it to the opening for entry into the receptacle, wherein
10 the apparatus is arranged such that exterior access to the opening is at least substantially prevented by the receiving and delivering means when the receiving and delivering means is in a receiving condition for receiving the object and is prevented by means comprising at least another portion of the apparatus when the receiving and delivering means is in a delivery condition at which the object can pass therefrom to the opening.

15

In accordance with another aspect of the present invention there is provided an object handling apparatus comprising:

a supporting structure, and a drawer movably received by said supporting structure such that the drawer may be moved between an extended position wherein a portion of
20 the drawer extends from the supporting structure, and a closed position wherein the drawer is substantially enclosed by the supporting structure, said drawer including an aperture for receiving an object, and retaining means which, in use, acts to retain an object when received in the aperture when said drawer is in said extended position, and which, when the drawer is moved from the extended position to the closed position,
25 moves to allow the object to pass through said aperture and into the supporting structure.

The apparatus may include an object guiding device for guiding an object from the aperture to an object supporting means within the supporting structure, comprising a lengthwise extending chute, and having guiding elements disposed at spaced locations
30 along opposed internal side surfaces, the elements being disposed, along the direction of the extent of the chute, on alternating ones of the surfaces, and being so formed as to permit a cylindrical object to pass through the chute with its axis transverse to the



direction of extent of the chute such that, during such passage, the object is successively engaged by ones of the elements on the opposite surfaces so as to align the axis of the cylindrical object to be at a predetermined angular disposition relative to the direction of extent of the chute.

5

An object manipulating apparatus may also be included for manipulating an object guided to the object supporting means, comprising object moving means for selectively engaging the object and moving it from the object supporting means, said object moving means comprising a transport member movable between first and second positions and
10 extendible means movable between extended and retracted positions the object supporting means and the object handling means being arranged whereby when the extendible means is extended and the object moving means is moved from said first position to said second position the extendible means engages the object to effect said movement from the supporting means, the object not being moved when the extendible means is retracted.

15

Preferably the object manipulating apparatus is constructed such that said object may be moved in a first direction from said object supporting means by extending said extendible means while said transport member is in said first position and moving said transport member to said second position, with said extendible means in said extended
20 position, and may be moved from said object supporting means in a second direction by extending said extendible means while said transport member is in said second position and moving said transport member to said first position with said extendible means extended.

25

Embodiments of the apparatus of the invention are particularly adapted for use



Embodiments of the apparatus of the invention are particularly adapted for use where the objects to be handled, guided or manipulated comprise cash. Thus, the object handling and manipulating apparatus may comprise a cash dispensing apparatus.

5 A preferred embodiment of the present invention will hereinafter be described in detail, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 is a front perspective view of a cash dispensing apparatus constructed in accordance with the present invention;

10 Figure 2 is a plan view of a drawer mechanism forming part of the apparatus of Figure 1, in an extended position;

Figure 3 is a plan view of the drawer mechanism of Figure 1, in a retracted position;

15 Figures 4 and 5 are cross-sectional side views of the drawer mechanism in positions corresponding to those of Figures 2 and 3 respectively;

Figures 6 and 7 are front views of the drawer mechanism in positions corresponding to those of Figures 2 and 3 respectively;

Figure 8 is a cross-sectional side representation of the cash device apparatus, showing particularly a dispensing mechanism thereof in a forward position;

20 Figure 9 shows the dispensing mechanism of Figure 8 in a rear position;

Figure 10 shows a guiding and storage mechanism of the cash dispensing apparatus;

Figure 11 is a block diagram of the control system of the cash dispensing apparatus; and

25 Figure 12 is a flow chart of the major event sequence in the normal course of operation of the cash dispensing apparatus.

Figure 13 is a fragmentary cross-section of a control means incorporated into the apparatus.

30 The cash dispensing apparatus 200 shown is designed for the temporary storage of money in a plurality of monetary denominations. The apparatus may be used in

retail stores which ordinarily hold only a minimal amount of cash change in a cash register at any one time. In retail stores of this type, once money of greater than, say \$50, has collected in the register the excess money is placed in a safe. Once inside the safe the money is not easily accessible, creating a difficulty if more change is
5 required to complete a transaction than is in the register.

The cash dispensing apparatus 200 provides both a temporary storage region and a safe storage region within the apparatus. Money to be stored in the cash dispensing apparatus is collected together by denomination into predetermined
10 amounts, and enclosed in objects such as tubes suitable for storage in the apparatus. Once the objects containing the money are introduced into the apparatus, they pass into the temporary storage region, where they may remain or be forwarded directly into the safe storage region. Objects remaining in the temporary storage region may at a later time be forwarded to the safe storage, or be retrieved from the apparatus, on
15 request.

Referring more particularly to Figure 1, the apparatus 200 comprises four major mechanical portions: an induction portion 134, a guiding and storing portion 136, a dispensing portion 138, and a safe storage portion 140. The major mechanical
20 portions, together with controlling electronic circuitry 122, are, for the most part, encased and protected by the external apparatus casing 128. The external casing also comprises a front panel 142 which is not shown in Figure 1, but is shown in Figures 8 and 9. Within the upper part of the casing there is a chamber 170 which is horizontally slidable so as to be movable between extended and retracted positions.
25 The drawer is shown in its extended portion in Figure 1 at which it extends outwardly from an opening (not shown) in the front panel 142.

In use, the front panel 142 is fitted to the apparatus 200 such that, with the drawer 170 in its retracted position, the only externally visible components are a safe
30 door 124, a control panel 52 and a receiving tray 70 (Figure 8). The control panel 52 is fitted to the front of the drawer 170 and comprises a numerical keypad 150, a series

of control keys 130, and a display means 132. All of the functions of the apparatus may be controlled from the control panel except, opening the safe door 124 which requires a key for a door lock 152. The safe door may also have a time controlled lock mechanism which is operable from the control panel 52 using a security code entered via the keypad 150. The control keys 130 include denominational keys which correspond to the various monetary denominations which may be stored within the apparatus 200, and a "vend" key. The keypad 150 is a standard numeric type keypad which may be used for entering non-denominational data and such control operations as security codes which may be required to carry out certain functions. The display means 132 is an alphanumeric character display, such as a liquid crystal device, which may be used both for outputting information and prompting the user for input.

During normal operation the two major functions of the cash dispensing apparatus are the induction function and the dispensing function. The induction function permits introduction of money into the apparatus, and involves use the induction portion 134 of the apparatus 200.

The money is packed in cylindrical tubular holding objects 160 prior to induction into the apparatus. Coins of the same denomination are stacked coaxially into holding object 160 of a size adapted to fit their particular diameter and to hold a predetermined monetary value. Bank notes of the same denomination are rolled up and enclosed within similar objects 160. The suitable arrangement is to allow for denominations of 5c, 10c, 20c, 50c, \$1 and \$2 coins, and \$5, \$10, \$20 and \$50 notes.

Money is introduced into the apparatus 200 by means of the induction portion 134. First, an unlocking security code is entered via the numeric keypad 150. This enables the drawer 170 to be extended from the apparatus casing as is shown in Figure 1. Extending the drawer exposes a tray 4 of the drawer, and in particular exposes a series of tray apertures 24, one aperture for each of the above mentioned monetary denominations, and each of a size adapted to fit its particular sized holding object. The objects containing the money are placed on drawer 170 upon the apertures 24

thereof. Only one holding object 160 for each monetary denomination may be placed on the tray during a single operation. When the drawer is then moved from the extended position back to the retracted position, the holding object 160 placed upon the tray are allowed to pass through the apertures to thereby enter the guiding and storage portion 136 of the apparatus 200.

When money is required to be dispensed from the apparatus, the appropriate units of the denominations are selected using the corresponding control keys 130 of the control panel 52. This activates the dispensing portion 138 of the apparatus which acts to move the appropriate holding objects 160 from guiding and storing chambers forming part of the guiding and storage portion 136. Figures 8 and 9, show a receiving tray 70 to which the holding objects 160 are then so moved via a front receiving ramp 68. Similarly, the dispensing portion can dispense money to the safe storage portion 140 via the rear receiving ramp 66 (Figure 8), either under manual control via the control panel 52 or automatically when any particular storage chamber is filled to a certain threshold limit.

Figures 2, 4 and 6 show a part of the drawer 170 in its extended position. The drawer 170 comprises a drawer tray 4 which is slidably mounted on bearings (not shown) to allow it to extend and retract from the apparatus casing 128. The drawer tray is formed with apertures 7 large enough to allow the objects 160 to pass there through. Front and rear retainers 6 and 8 are slidably mounted on the drawer tray 4 and resiliently forced toward each other by means of front and rear compression springs 26 and 28. Portions of the front and rear retainers project into the apertures 7 in the main draw tray 4, forming apertures which are shorter in length than the objects to be placed thereon. Thus the objects placed on the drawer are restrained from passing through the apertures 7 by means of projecting portions of the front and rear retainers which support the objects while the retainers are forced together. A draw tray template 5 is situated on top of the front and rear retainers 6 and 8 and is formed with the aforementioned apertures 24 which overly respective tray apertures 7 and are sized to closely match the respective sizes of the various objects to placed

on the drawer. In all, the drawer contains eleven apertures 24 and eleven underlying apertures 7, there being one pair of apertures 24, 7 for each of the denominations previously mentioned, and one "save" pair of apertures.

5 In use, the objects 160 are placed in the apertures 24 in template 5 whilst the drawer is in its extended position, as shown in Figures 2, 4 and 6. The objects placed thereon are substantially secured from movement by the support of the projecting portions of the front and rear retainers 6 and 8, and by the edges of the draw tray template apertures 24.

10

 The drawer 170 further comprises at each side thereof a respective pair of front and rear activator guides 10 and 12. Each guide 12 is positioned to extend in upstanding disposition from a location towards the front of the drawer in a rearward direction. The guides 10 are positioned in alignment with the respective guides 12 and extend from locations adjacent rear ends of the guides 12 towards the rear of the drawer 170. The rear end of each guide 12 and the adjacent forward end of the respective associated guide 10 have sloping guide faces 11. The guide faces of each pair of guides 10, 12 converge downwardly towards each other, so as to form a respective depression 173 therebetween. The guides 10 are mounted to the rear
20 retainer 8 for movement therewith in the front to rear direction of the apparatus, and are consequently biased by the aforementioned spring 28 in the forward direction of the apparatus. The guides 12 are mounted to the front retainer 6 for movement therewith in the front to rear directions and are consequently biased by the aforementioned spring 26 in rearward direction. Two roller bearings 18 are also
25 provided, one to either side of the apparatus. In Figure 4 the roller bearings 18 are shown as being peripherally engaged with upper surfaces of the rear respective activator guides 10 as the drawer is being extended or retracted. The roller bearings 18 are coupled together by a bearing shaft 20 which is mounted for pivotal movement about a side-to-side extending axis 21 by means of bearing shaft pivot arms 22. The
30 roller bearings are resiliently biased downwardly towards the activator guides by means of biasing springs 30.

When the drawer 170 is moved towards its retracted position, the roller bearings 18 roll over the upper surfaces of the rear activator guides 10 until they reach the depression 173 formed by the sloping guide faces 11 of the front and rear activator guides. Under action of the biasing springs 30 the roller bearings 18 on each side of the tray are forced into the depressions under pivotal movement of the arms 22 about axis 21. The action of the roller bearings being forced into the depressions is effected under movement of the activator guides 10, 12 so that each guide 10 is moved relative to tray 4 rearwardly and each guide 12 is moved relative to tray 4 forwardly. Thus, this action forces the front and rear activator guides 10 and 12 apart against resilient bias of springs 26, 28. The latter movement removes the supporting projecting portions of the retainers from beneath the objects placed on the apertures 24, and allows the objects to pass downwardly through the template apertures 24 and the apertures 7 in the drawer tray 4 (Figure 5).

Figures 3, 5 and 7 show the drawer mechanism 170 with the drawer in its fully retracted position. In this position the roller bearings 18 are forced down between the front and rear activator guides 10 and 12 by means of the bearing shaft biasing springs 30, thus locking the drawer in the retracted position against any extending movement, forward movement of the drawer being particularly prevented by engagement of the roller bearings 18 with the front ends of the guides 10. When the drawer is required to be extended, for example to place more objects on the tray to be received into the apparatus 200, a security code is entered using the numeric keypad 150 of the control panel 52, causing the electronic controlling circuitry to drive the roller bearing control means 120 to unlock the drawer. This is effected by driving a cam 175 mounted to a rotatable shaft 177 of a geared electric motor 179 within the roller bearing control means 120 and fixed relative to the apparatus casing. When the security code is entered the control circuitry drives the motor, causing the cam to engage the bearing shaft which lifts the bearing shaft away from the tray and the roller bearings out of the depressions 173. While the roller bearings are being lifted against their bias from the activator guides the drawer is able to be extended from the apparatus casing. The springs 26, 28 then revert the guides 10, 12 and the front and rear retainers 6 and 8

to the positions of Figure 4. In this embodiment, the drawer must be extended and retracted manually by the user of the apparatus.

Figure 10 shows the structure of an object guiding chute 100 which comprises the guiding and storage portion 136 of the apparatus 200. The guiding and storage portion 136 comprises a plurality of guiding chutes 100, one for each aperture 24 in the drawer mechanism 2 (Figure 2). The guiding chutes are located directly underneath the apertures 24 while the drawer is in its retracted position. Thus, objects 160 placed on the tray to be introduced into the apparatus pass through the apertures and into input apertures 106 of the guiding chutes when the drawer is moved from its extended position to its retracted position in the manner described hereinbefore. Once in the chute, the object 160 follows a path defined by the internal side surfaces 104 and the guide members 102. By successively engaging the guide members 102 on opposite sides of the chute the course of travel of the object 160 into and through the chute is slowed, and the axis of the cylindrical object is kept substantially horizontal. Arrows 181 in Figure 10 show the path of movement.

If more objects are inducted into the apparatus than are dispensed, then the objects are stored temporarily in the guiding chute 100 by stacking, as shown in Figure 10. The lowermost object 56 is supported upon the object supporting means 72 of the dispensing portion 138, as can be seen Figure 8. When the object 56 is dispensed by the dispensing means, the next object in the stack drops to the supporting means 72 and all of the other objects in the same chute move down accordingly.

The object guiding chute 100 also includes a sensor switch 111 which senses when an object passes it in the guiding chute. The sensor is situated at the top of the tube, and enables the controlling electronic circuitry 122 to keep track of the number of objects which enter the guide. Together with a knowledge of how many objects are dispensed from each chute, the controlling circuitry is able to determine how many objects are situated in each chute at any particular time.

Figures 8 and 9 illustrate the dispensing portion 138 and the safe portion 140 of the apparatus 200. The lowermost object 56 of each guiding and storage chute is supported upon the object supporting means 72, which is formed with the aforementioned front receiving ramp 68 and rear receiving ramp 66. The supporting means 72 is also formed with slots 126, one located directly beneath each of the object apertures 110 of the guiding chutes 100. The dispensing portion also comprises a transport member 64 which supports solenoids 60 on mounting brackets 58. The shafts 62 of each solenoid 60 are located directly beneath respective ones of the slots 126 such that when a particular solenoid is energised its shaft 62 extends up through the corresponding slot 126 and above the supporting means 72.

The transport member 64 is supported for linear movement in the directions indicated on Figure 8 such that it is able to move between the position A shown in Figure 8 and the position B shown in Figure 9. This is carried out by means of an electric transport motor 59 mounted on the transport base 74. The motor is provided with a cam member 191 having an upstanding projection 195 engaged in a side to side extending slot 193 in the bottom of the transport member 64. The transport member 64 carrying the solenoids 60 is drivable between positions A and B by actuating motor 59 to rotate the cam so that the projection 195 engages the transport member 64 to effect linear back and forth reciprocation of the transport member. During this movement the projection 195 moves in the side to side direction in slot 195.

When money is required to be dispensed from the temporary storage region 136 of the apparatus, the user first selects the denominations required using the control keys 130. The user then presses the "vend" key which activates the apparatus of the dispensing portion 138. To dispense the money to the user the transport member 64 and solenoids 60 are first moved to position B by the transport motor 59, under control of the control system 122. Then the solenoids 60 corresponding to the denominations selected by the user are energised so that their shafts 62 project through the slots 126 in the supporting means 72. The transport motor 59 is then driven so as to move the transport member and solenoids to position A. As the solenoids are

5 moved from position B to position A the solenoid shafts 62 which are projecting through the supporting means 72 engage the rear surface of the corresponding objects 56 and push them from their position underneath the guiding and storing chamber 54 to the front receiving ramp 68. The slope on the front receiving ramp 68 ensures that the objects then fall into the receiving tray 70 to be retrieved by the user. When the operation is complete the solenoids are de-energised so that the shafts 62 are retracted.

10 Similarly, if money is required to be dispensed to the safe 124, the solenoids are moved to position A, the solenoids corresponding to the objects to be dispensed are energised, and the solenoids moved to position B, thus engaging the front surface of the corresponding objects 56 and pushing them into the safe 124 via the rear receiving ramp 66.

15 The entire operation of the apparatus 200 is controlled by means of microprocessor based electronic controlling circuitry 122. Figure 11 shows a block diagram of the interaction of the control system 122 with the associated electrical components of the apparatus 200. The control circuit receives manual input from the input keys 130 and 150 or from a remote access port 131, and internal input from the guiding chute sensor switches 111. The remote access port 131 allows communication
20 between the apparatus 200 and a computer at a remote site, for example via a modem and telephone link. The microprocessor controlled system 122 also provides output to the output display 132 or the remote computer via the remote access port 131. The microprocessor controller 122 acts under pre-programmed instruction to control the
25 time controlled safe lock 123, the roller bearing control means 120, the solenoids 60 and the transport motor 59, in accordance with the external input received. The microprocessor controller may also provide information to the user, via the display means 132 or the remote access port 131, relating to the total amount of money presently stored in the entire apparatus 200, in each chute 100, or in the safe 124.

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Figure 12 is flow chart of the basic operation of the control system 122. The

branch of the flow chart beginning at step 502 relates to the procedure carried out when the dispensing function is selected by a user. Step 502 requires that the user enter a security code in order to carry out the operation. At step 504 the user enters instructions to the apparatus as to the amount of money required, the denominations,
5 and whether to dispense the money to the user via receiving tray 70 (Figure 8) or to the safe 124. If the requested denominations are not available at step 506 then a message is displayed on the display means 132 and further instructions at step 504 are required. If the requested denominations are available in the storage chambers 54 and the money is to be dispensed to the user, the steps 512 to 516 carry out the dispensing
10 operation. If the money is to be dispensed to the safe 124 then steps 562 to 566 are carried out to move the appropriate objects to the safe via the rear receiving ramp 66.

Step 550 designates entry of a security code necessary for the start of the inducting function of the apparatus 200. At step 551 the control system activates the
15 roller bearing motor via the roller bearing control means 120, to enable the user to extend the drawer 170 from the apparatus casing 128 (step 552). At step 554 the user places the objects to be introduced into the apparatus onto their appropriate apertures of the tray as hereinbefore described. The drawer is then moved back to its retracted position at step 556, and the objects on the tray are allowed to pass into the input
20 apertures 106 of the object guiding chutes 100. As the objects pass the sensor switches 111 the microprocessor controller registers which chutes have had objects placed in them (step 557), to enable the controller to keep track of the number of objects in each guiding chute. If the number of objects in any particular chute exceeds a predetermined number, then that chute is deemed to be full (step 558). If
25 any of the chutes are full then steps 562 to 566 are carried out to dispense objects from the full chutes to the safe 124 via the rear receiving ramp 66.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An object handling apparatus for storing objects, comprising a receptacle
5 having an opening therein for receiving an object into the receptacle, and receiving
and delivering means for receiving the object and delivering it to the opening for entry
into the receptacle, wherein the apparatus is arranged such that exterior access to the
opening is at least substantially prevented by the receiving and delivering means when
the receiving and delivering means is in a receiving condition for receiving the object
10 and is prevented by means comprising at least another portion of the apparatus when
the receiving and delivering means is in a delivery condition at which the object can
pass therefrom to the opening.
2. An object handling apparatus according to claim 1, wherein said receptacle is
15 contained within a supporting structure, and said receiving and delivering means
comprises a drawer movably extendable from said supporting structure.
3. An object handling apparatus according to claim 2, wherein said receiving and
delivering means is in said receiving condition when said drawer is extended from
20 said supporting structure, and is in said delivery condition when said drawer is
received at least substantially within said supporting structure.
4. An object handling apparatus according to claim 3, wherein when said drawer
is in said delivery condition, a first portion of said drawer is located above said
25 opening of said receptacle whereby said object can drop from said first portion into
said opening and thereby into said receptacle.

5. An object handling apparatus according to claim 3 or 4, wherein said drawer includes at least one moveable retaining portion which, in use, retains a said object when the drawer is in the receiving condition, and which, when the drawer is moved from said receiving condition to said delivery condition, moves to allow the object to
5 pass to said opening.

6. An object handling apparatus according to claim 5, wherein said first portion of said drawer includes an aperture shaped to allow a said object to, in use, pass therethrough, and wherein said at least one moveable retaining portion acts to retain
10 said object in said aperture whilst the drawer is in the receiving condition, and allows the object to pass through said aperture to said opening when said drawer is in the delivery condition.

7. An object handling apparatus according to claim 6, wherein said at least one
15 retaining portion obstructs at least a portion of said aperture when the drawer is in the receiving condition such that, in use, a said object placed in said aperture is supported by said at least one retaining portion.

8. An object handling apparatus according to claim 7, wherein said aperture is
20 generally elongate ⁱⁿ shape ~~is~~ and said at least one retaining portion comprises first and second support members for obstructing respective ends of the aperture whereby to enable the ends of an elongate object to be supported thereon, said support members being resiliently biased toward positions where they obstruct their respective aperture ends.

25
9. An object handling apparatus according to claim 8, wherein said drawer is provided with first and second activator guides, respectively coupled for movement with said first and second support members, whereby in the action of moving said drawer from the extended receiving condition to the delivery condition an activating
30 member provided within said supporting structure is forced between said first and second activator guides to thereby move said support members from underneath said



object and allow the object to pass through said aperture to said receptacle opening.

10. An object handling apparatus according to claim 9 wherein said activating member co-operates with at least one of said activator guides to, in use, secure said
5 drawer in said delivery condition.

11. An object handling apparatus according to any ^{one of the preceding claims} ~~preceding claim~~ wherein said receptacle is provided with a plurality of openings for receiving objects.

10 12. An object handling apparatus according to claim 11 as appended to any one of claims 6 to 10, wherein said drawer includes a plurality of said apertures, each corresponding to a respective said opening.

13. An object handling apparatus comprising:
15 a supporting structure, and a drawer movably received by said supporting structure such that the drawer may be moved between an extended position wherein a portion of the drawer extends from the supporting structure, and a closed position wherein the drawer is substantially enclosed by the supporting structure, said drawer including an aperture for receiving an object, and retaining means which, in use, acts to retain an
20 object when received in the aperture when said drawer is in said extended position, and which, when the drawer is moved from the extended position to the closed position, moves to allow the object to pass through said aperture *and into the supporting structure.*

14. An object handling apparatus according to claim 13, including a plurality of
25 said apertures, adapted for receiving objects of different sizes.

15. An object handling apparatus according to claim 13 or 14, wherein said retaining means comprises a supporting element moveable between a first position wherein a portion of said element obstructs at least a portion of the or each aperture,
30 and a second position wherein the or each aperture is not obstructed by said element.



16. An object handling apparatus according to claim 15, wherein said supporting element is resiliently biased toward said first position.

17. An object handling apparatus according to claim 15 or 16, wherein said supporting element is biased into said first position whilst said drawer extends from the supporting structure, and is moved to said second position against said bias in the course of moving said drawer to said closed position.

18. An object handling apparatus according to claim 17, wherein the movement of said supporting element to said second position occurs, in use, whilst said drawer is substantially enclosed within said supporting structure.

19. An object handling apparatus according to any one of claims 15 to 18, including an activator guide coupled for movement with said supporting element, and an activating member which, in use, bears against said activator guide so as to move said supporting element from said first position to said second position by movement of said activator guide during movement of said drawer from the extended to the closed position.

20. An object handling apparatus according to claim 19, wherein said supporting structure includes a receptacle for storing objects, and wherein, when said drawer is in said extended position, the or each aperture is in a position to enable an object to be placed therein and supported by the supporting element, and when said drawer is in said closed position the or each aperture is in a position to deliver the object to the receptacle.

21. An object handling apparatus according to any one of claims 14 to 20, wherein said apertures are of generally elongate form, and wherein said supporting element comprises a pair of elements which obstruct respective end portions of said apertures.

22. An object handling apparatus according to claim 21, wherein the movement of

the supporting elements is in a direction generally parallel to the direction of extent of said apertures, each of said pair of elements, in use, moving in an opposite direction.

23. An object handling apparatus according to claim 13, wherein an object which in use passes into the supporting structure through the aperture is guided to an object manipulating apparatus comprising object supporting means for supporting the object and object moving means for selectively engaging the object and moving it from the object supporting means, said object moving means comprising a transport member movable between first and second positions and extendible means movable between extended and retracted positions the object supporting means and the object handling means being arranged whereby when the extendible means is extended and the object moving means is moved from said first position to said second position the extendible means engages the object to effect said movement from the supporting means, the object not being moved when the extendible means is retracted.

15

24. An object handling apparatus according to claim 23, wherein the object manipulating apparatus is operative such that said object may be moved in a first direction from said object supporting means by extending said extendible means while said transport member is in said first position and moving said transport member to said second position with said extendible means in said extended position, and may be moved from said object supporting means in a second direction by extending said extendible means while said transport member is in said second position and moving said transport member to said first position with said extendible means extended.

20

25. An object handling apparatus according to claim 24 wherein an object moved in use from the object supporting means in the first direction is delivered to a dispensing tray accessible from outside the supporting structure, and an object moved in use from the object supporting means in the second direction is delivered to a safe storage region within the supporting structure and inaccessible in use from the outside thereof.

25

26. An object handling apparatus according to claim 23, 24 or 25, wherein an object guiding device is provided comprising a lengthwise extending chute extending from the

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aperture to the object supporting means to guide an object thereto, the chute having guiding elements disposed at spaced locations along opposed internal side surfaces, the elements being disposed, along the direction of the extent of the chute, on alternating ones of the surfaces, and being so formed as to permit a cylindrical object to pass through
5 the chute with its axis transverse to the direction of extent of the chute such that, during such passage, the object is successively engaged by ones of the elements on the opposite surfaces so as to align the axis of the cylindrical object to be at a predetermined angular disposition relative to the direction of extent of the chute, and deliver the object to the supporting means in said predetermined angular disposition.

10

27. An object handling apparatus substantially as hereinbefore described with reference to the accompanying drawings.

15 Dated this 13th day of December, 1994

CASH CONTROL COMPANY PTY. LIMITED

By its Patent Attorneys

20 DAVIES COLLISON CAVE

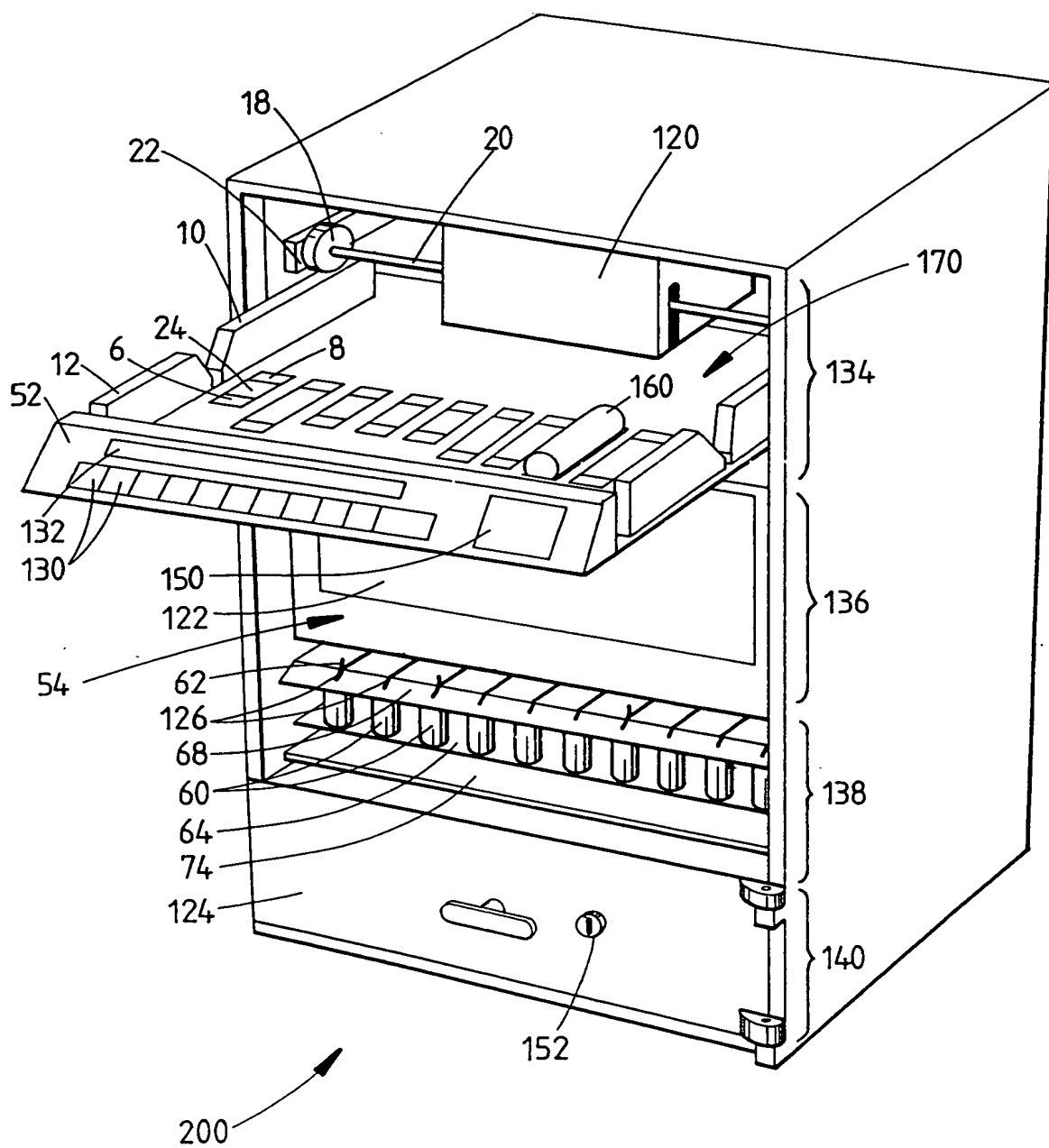
ABSTRACT

An object handling apparatus for handling and manipulating objects in moving the objects to and from a storage receptacle provided in a supporting structure. To insert objects into the receptacle there is provided a drawer which is extendable from the supporting structure, the drawer being adapted to receive objects of various predetermined sizes. When an object is placed on the drawer and the drawer is pushed into the supporting structure the object is able to be received into the receptacle. However, external access to the receptacle is prevented by the supporting structure and the drawer even whilst the drawer is in the extended position. Also enclosed is apparatus for moving objects stored in the receptacle to either an external access tray or to a secure compartment contained within the supporting structure. The apparatus is particularly suited for use in a cash induction, storage and dispensing machine.



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FIGURE 1



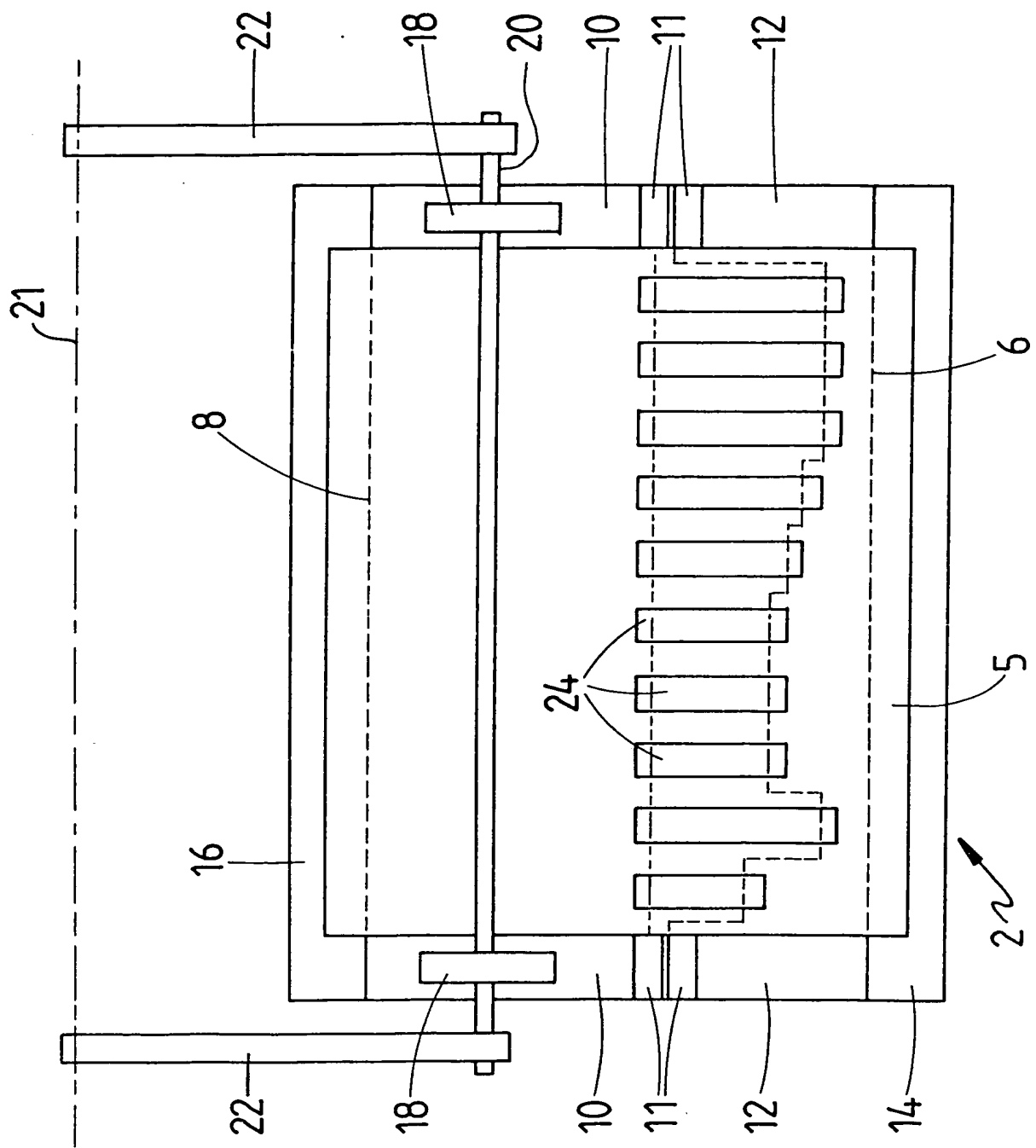


FIGURE 2

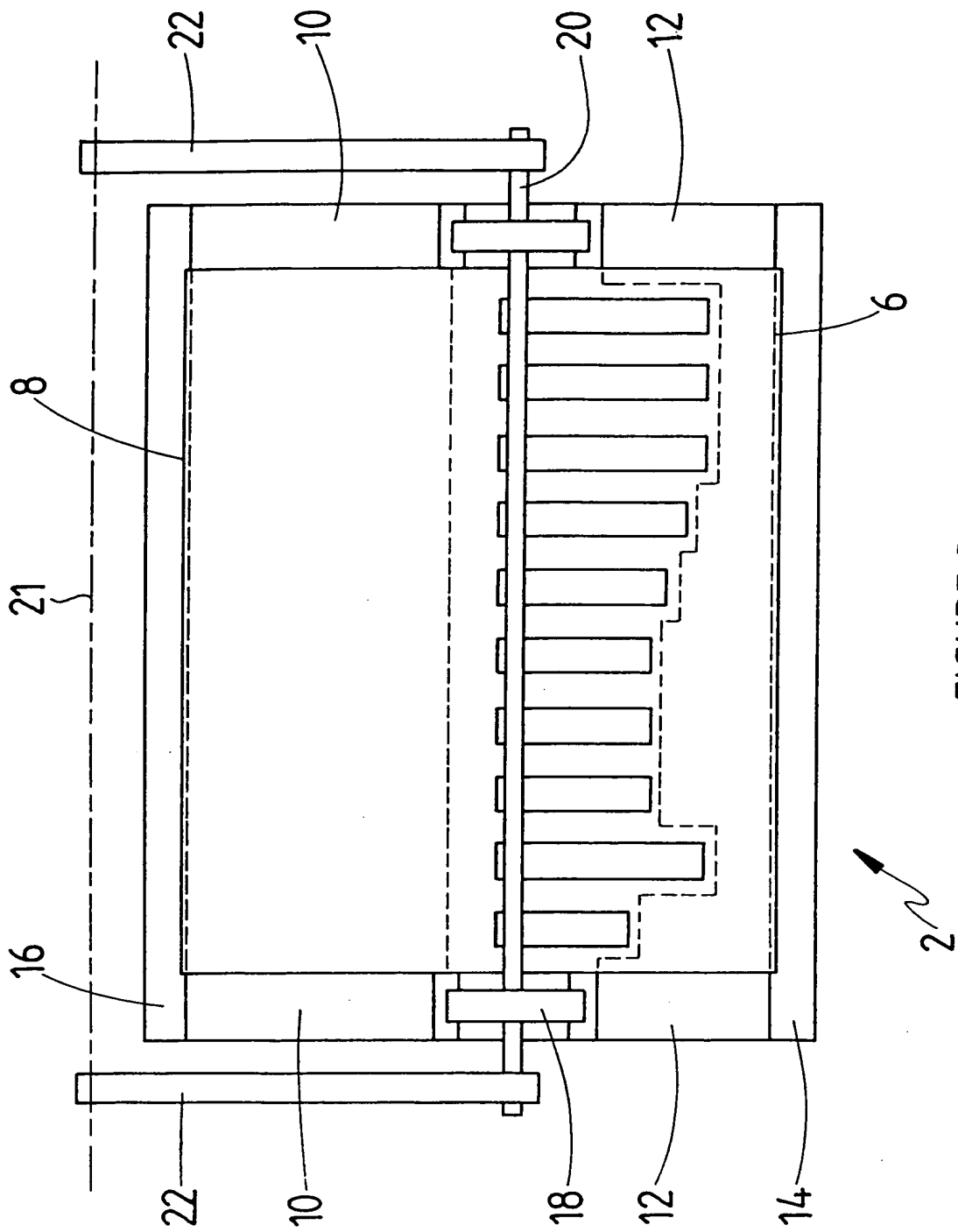


FIGURE 3

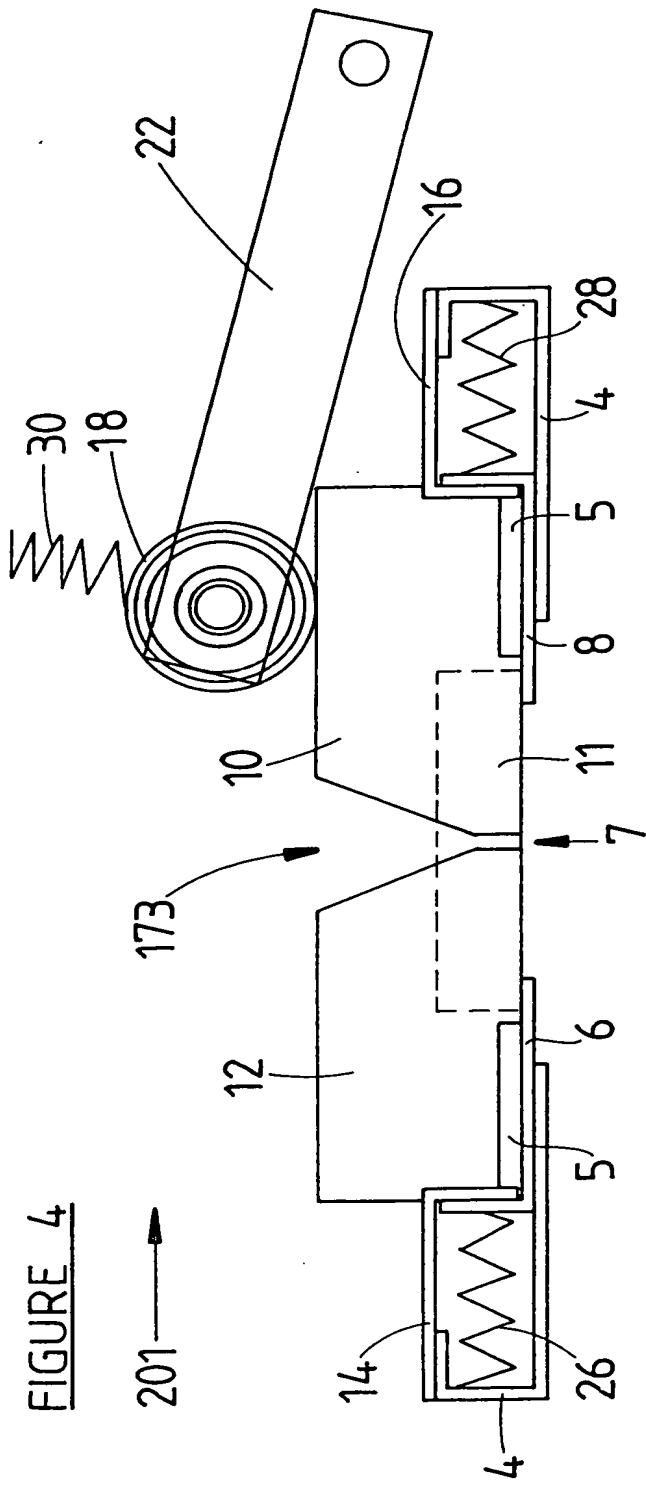


FIGURE 4

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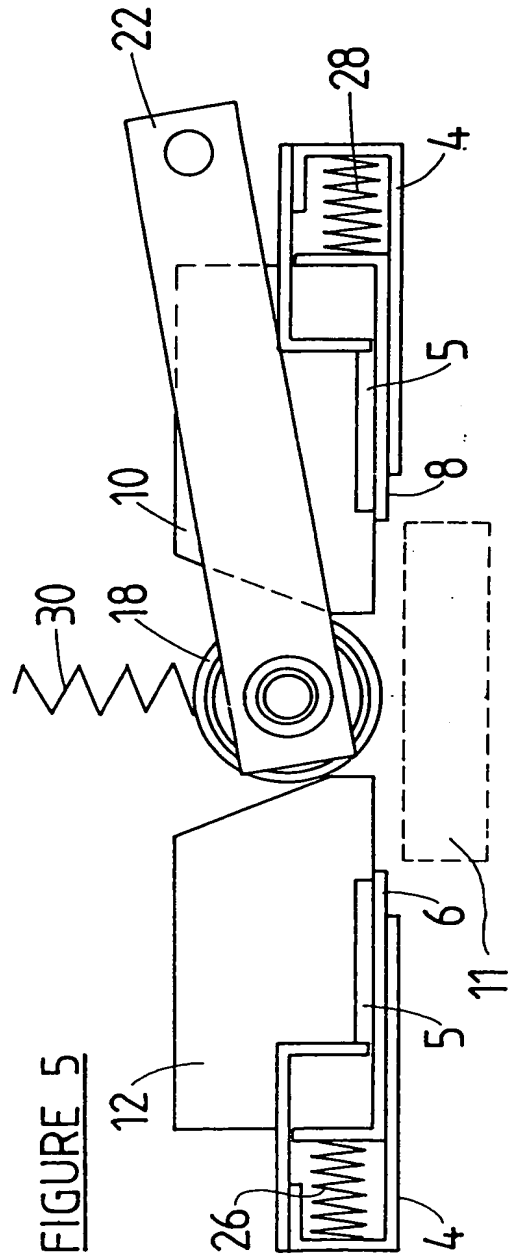
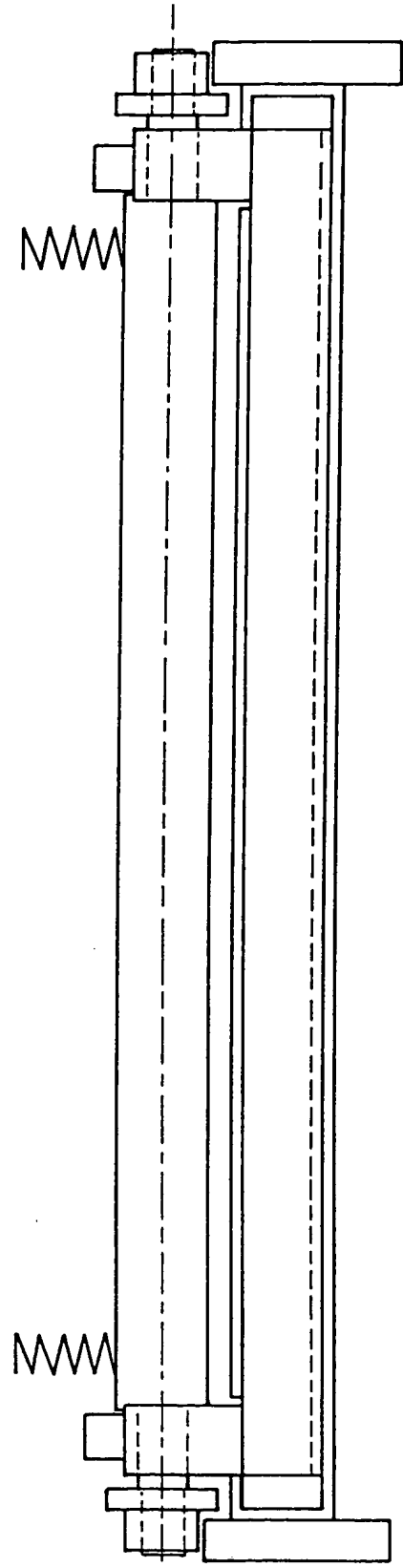
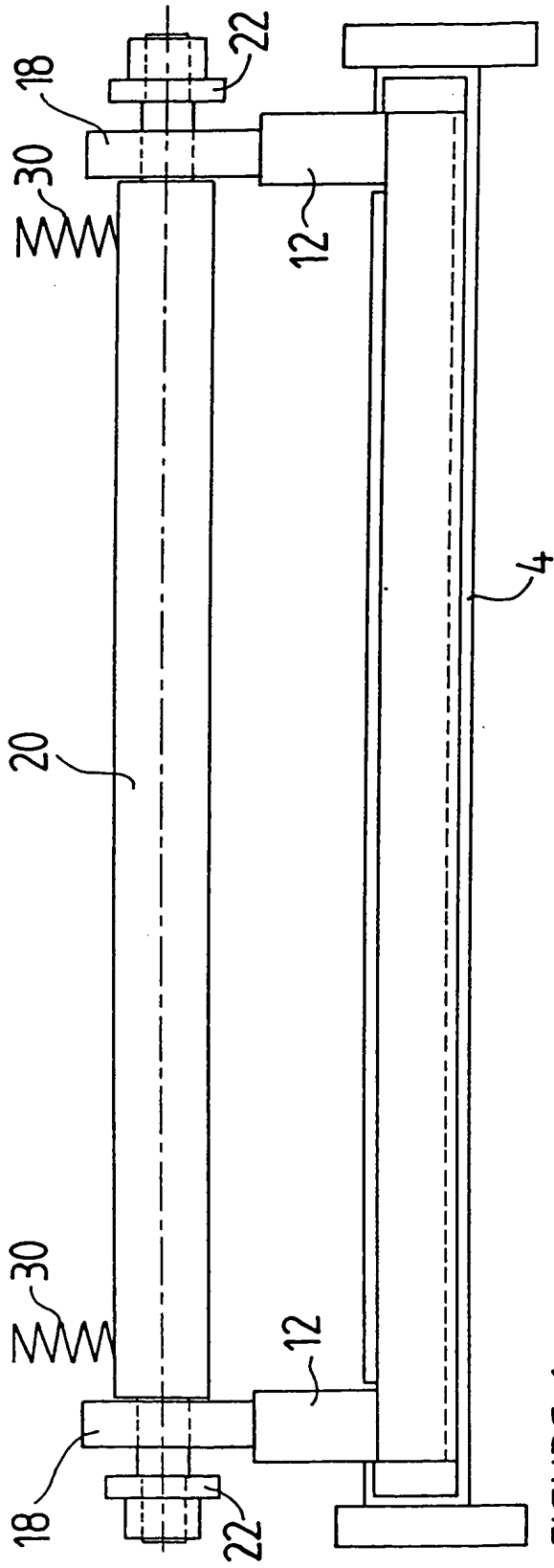


FIGURE 5



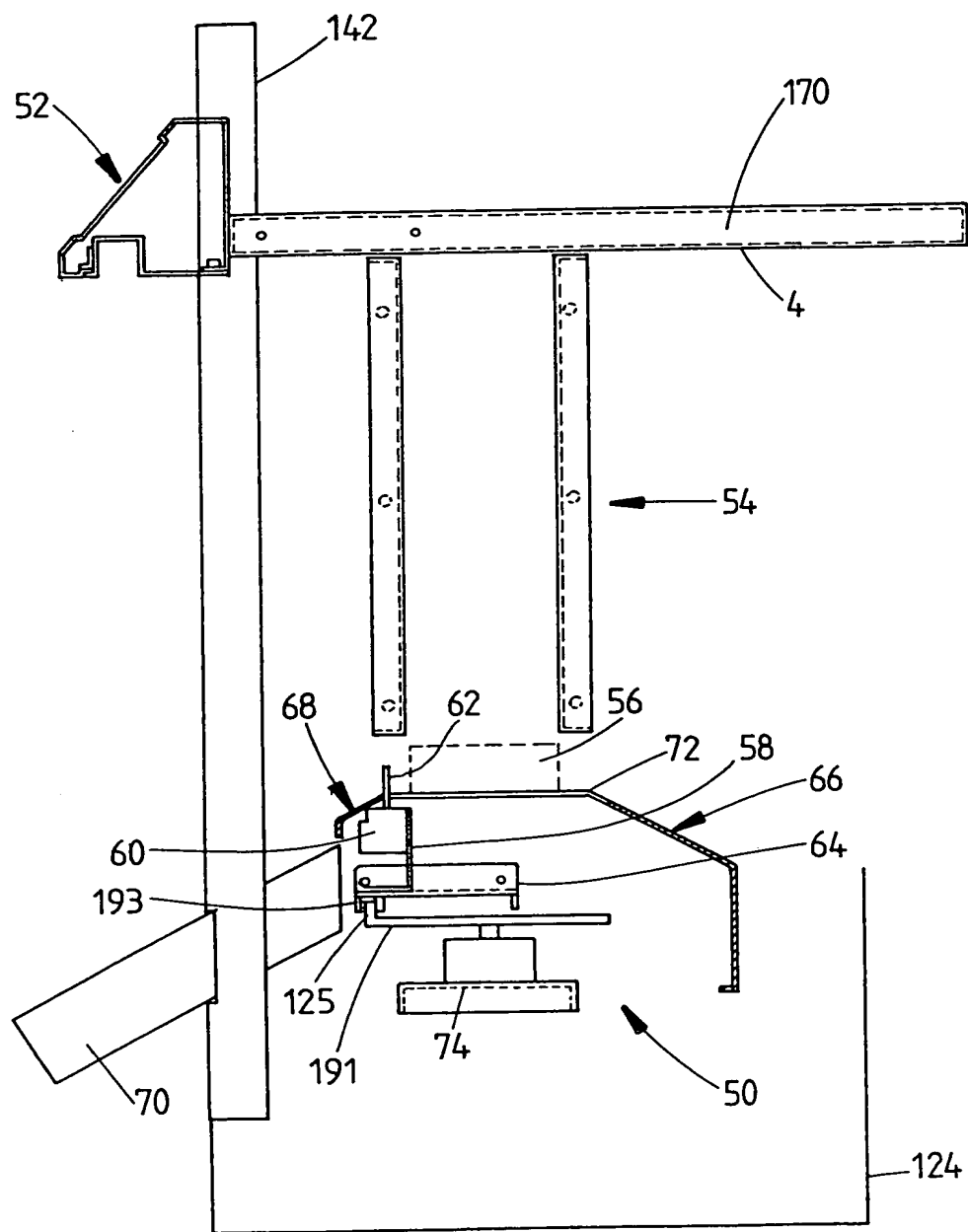
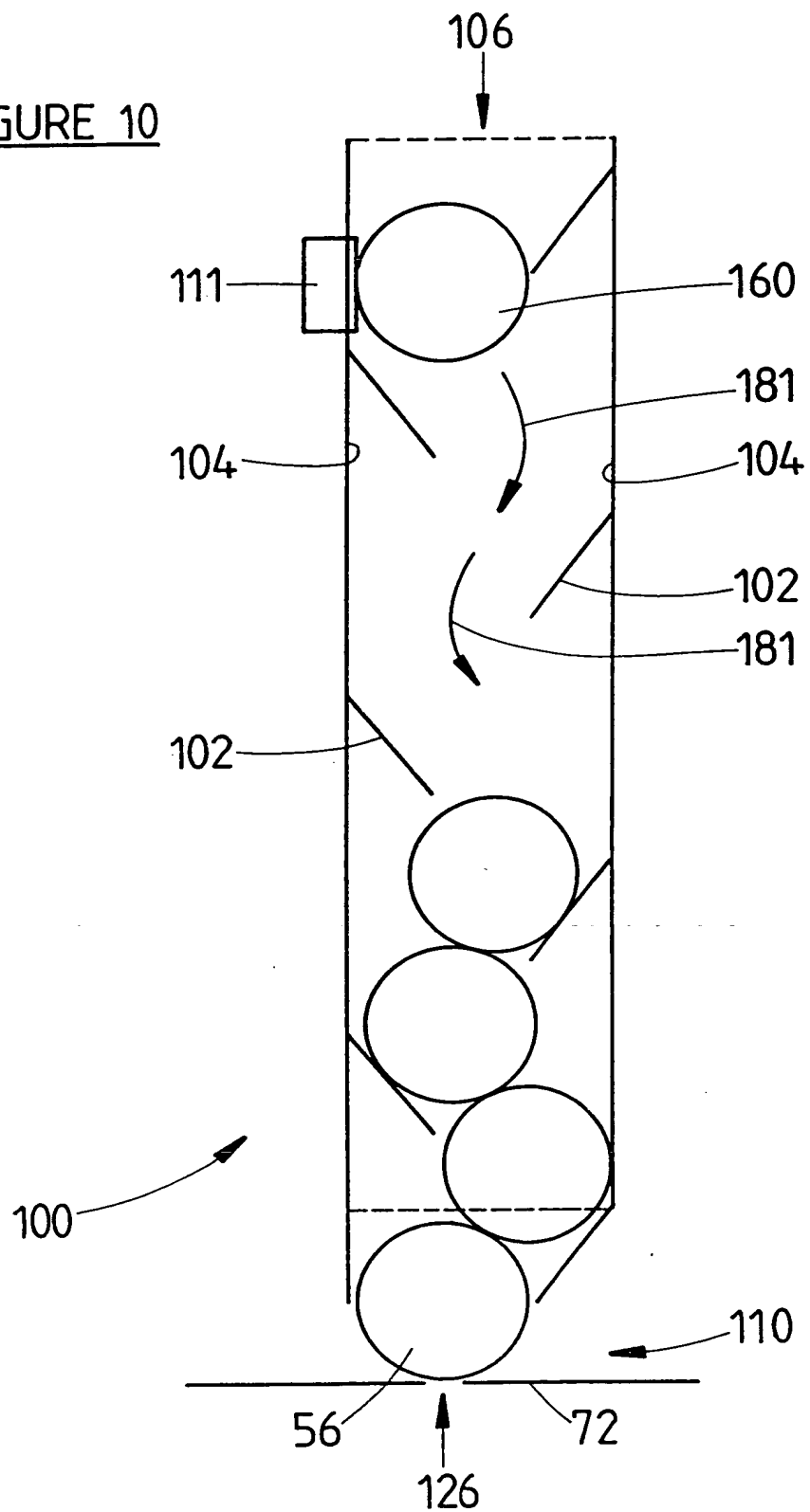


FIGURE 8



FIGURE 9

FIGURE 10



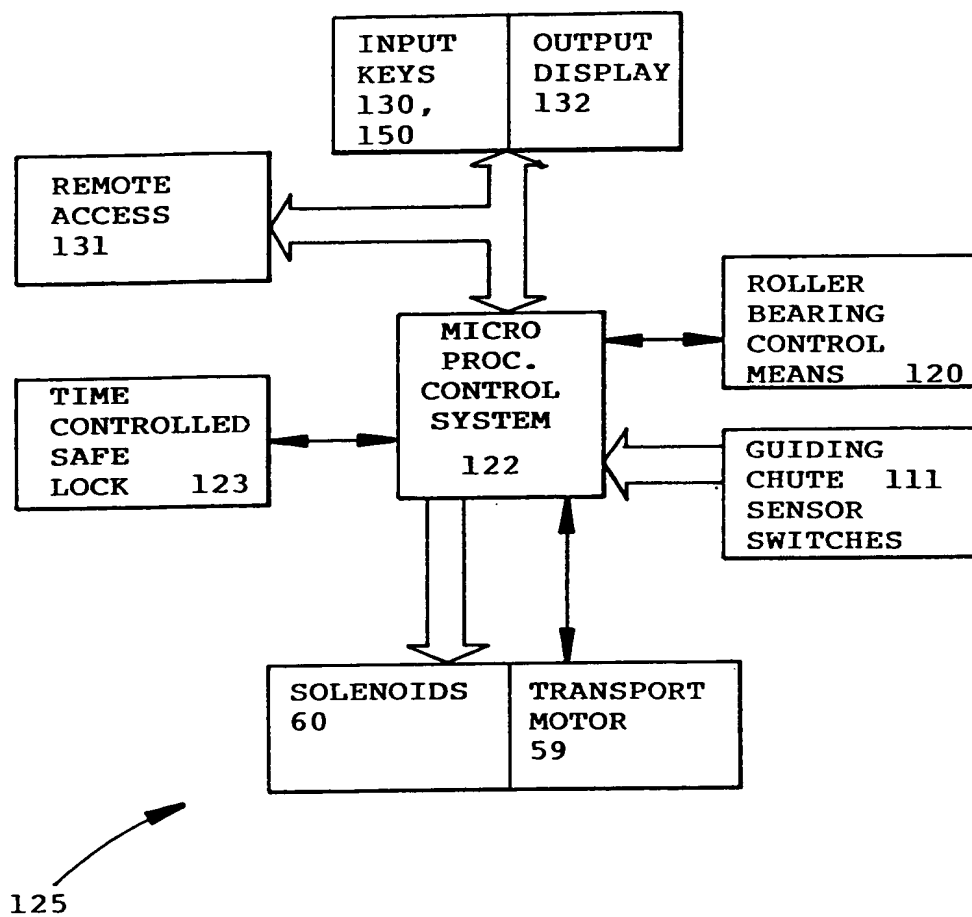


FIGURE 11

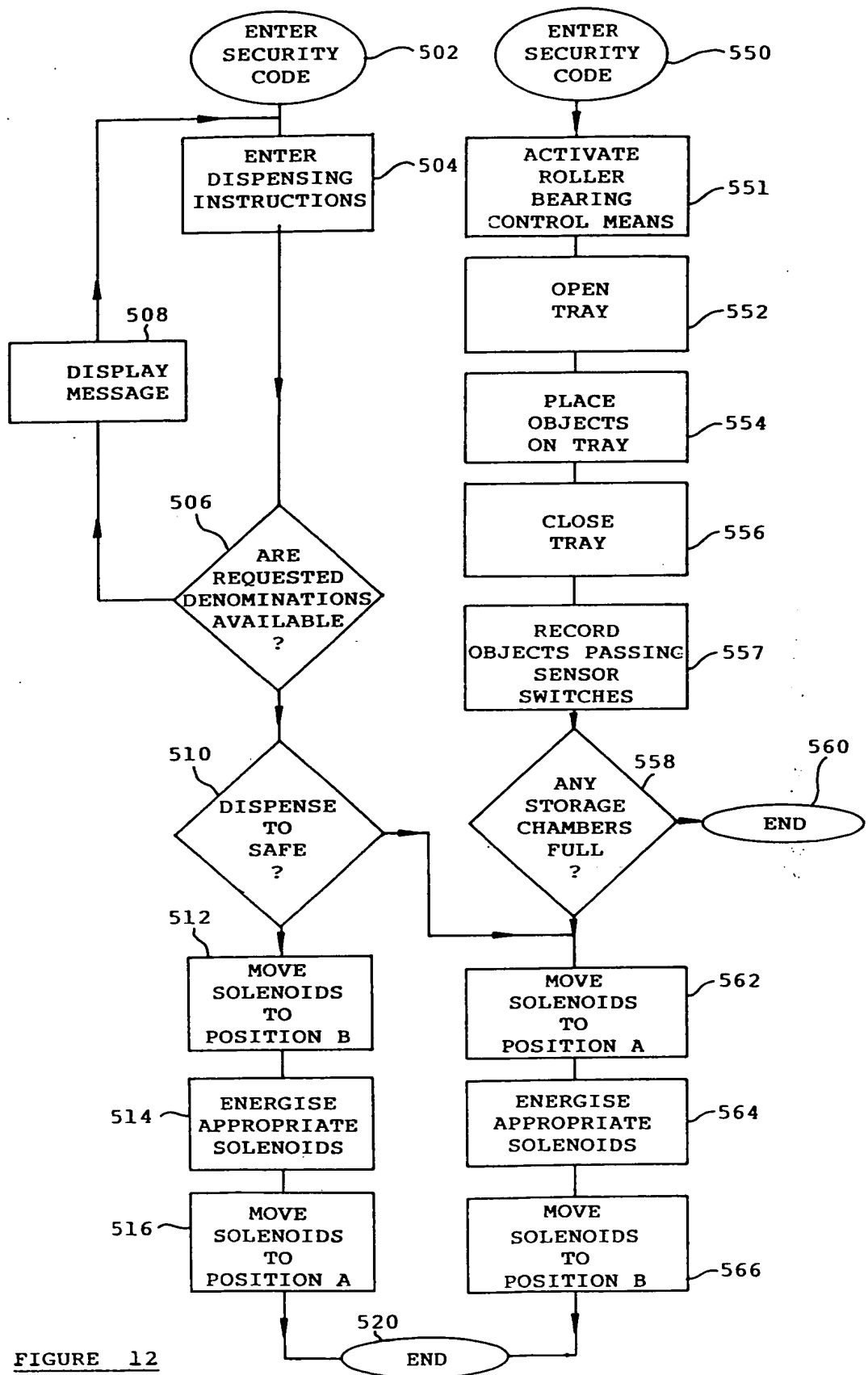


FIGURE 12

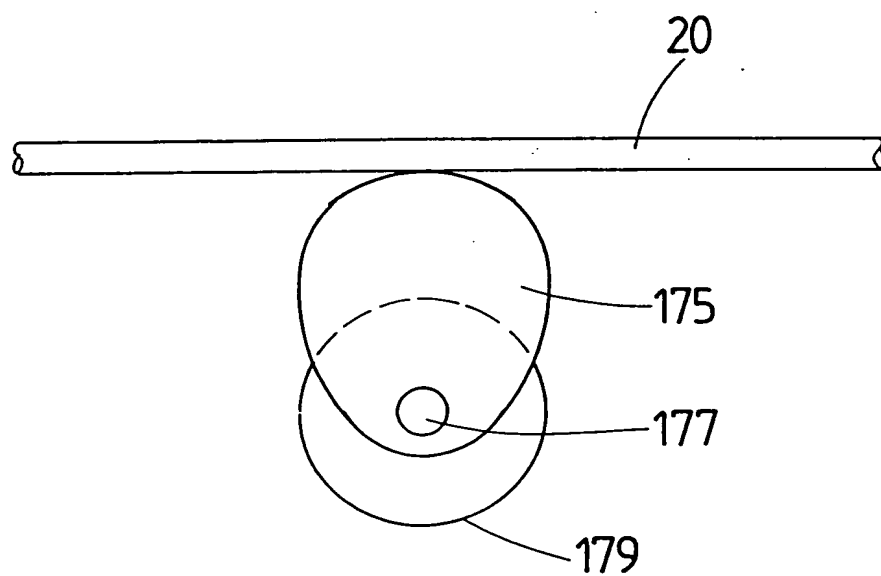


FIGURE 13